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ABSTRACT

Implications of the behaviorist and cognitive theories in language instruction are discussed in this article. Some contributions of Skinner, Politzer, Valette, Morton, Lane, and Mueller and Niedzielski clarify the behaviorists' view of language as a myriad of conditioned responses. In turn, the cognitive viewpoint, seen as the acquisiton and storage of knowledge, is examined in terms of the theory of Ausubel, Spolsky, Chomsky, Ohmann, Miller, McNeill, Markle, and Tieman. Concluding remarks suggest ways in which to combine elements of both theories in language teaching methodology. (RL)

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BEHAVIORISTIC AND COGNITIVE APPROACHES IN PROGRAMMED INSTRUCTION

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INTRODUCTION

Modern language teachers are faced with one central problem: developing the language learner's ability in the second language to the point at which his language as conscious attention is paid to the ideas to be communicated. In other words, language, to be functional, must become a habit. The second-language learner is successful to the extent that he can create, almost instantaneously, language appropriate to any given communicative context.

The problem then becomes one of habit formation. How are habits acquired? How does one arrive at a level of proficiency which makes conscious attention to the act unnecessary, or even impossible? In general, two quite divergent answers have been given to the question of habit formation, one based on a behavioristic interpretation of learning and the other based on a cognitive interpretation.

The Behavioristic Viewpoint

The behaviorists feel that learning is basically a process of conditioning. The learner is led through a series of stimulus-response situations which take him closer and closer to the desired goal. Learning takes place as the bond between the stimulus and its associated response is being formed. When the learner can give the desired response to the specific stimulus, he has learned that connection. A person's learned behaviors, then, consist of a myriad of conditioned responses.

The conception of learning outlined in the preceding paragraph is considered to be a mechanistic interpretation of learning since the mind is not assigned a role in the conditioning process. The following illustration from Markle serves as an excellent example of this mechanistic approach. She says that the student who can respond, "Paris is the capital of France." to the question,"What is the capital of France?" cannot be expected to answer the question,"What country is Paris the capital of?"[1] Although the response is the same, the stimulus in each case is different. Since the stimuli are different, the appropriate response to the new stimulus cannot be expected prior to the necessary antecedent conditioning process.

The behaviorists conceive of language as conditioned verbal behavior consisting of a complex collection of stimulus-response bonds. Therefore, their view of the language learning process is one of providing the student with sufficient practice to acquire the appropriate language responses. The student is to spend the major part of his time responding actively to selected stimuli. Language is a mechanical, not a mental, process and should be learned mechanically.

The basic tenets outlined in the preceding paragraph are, in general, based on experiments performed with animals by behaviorist psychologists. By presenting a series of stimuli and reinforcing selected behavior, these experimenters have been able to condition desired responses. The conclusions based on the results of these studies have been extended to include learning in other contexts and with other species as well, specifically the human one.

Language teaching as a whole has been greatly influenced by behavioristic theories of learning. The descriptive linguists who played such an important role in developing new language teaching techniques were oriented toward mechanistic interpretations of learning. Politzer has stated that behaviorism was one of the basic contributions of linguistics to the teaching of modern foreign languages in the 1940's.[2] Valette has pointed out that new textual materials in modern languages are based on the assumption that language learning is chiefly a mechanical process of habit formation.[3] Morton and Lane have asserted that the tasks associated with second language learning are "indistinguishable" from those involved in conditioning learning in the animal laboratory.[4] In fact, Lane has stated that "there is nothing extrapolative in the application of laboratory techniques and nothing metaphorical in the use of concepts gained from a functional analysis of behavior in the laboratory."[5]

In the past most programmed materials (with the exception of Crowder's branching programs) have reflected this mechanistic approach to learning. Almost without exception the published programs have been linear, and linear programs are applications, basically, of Skinner's behavioristic theories of learning. These Skinnerian materials conform to three basic principles. As the student progresses through the stimulus-response frames, he (1) is expected to make an active response to all stimuli, (2) is led through small step sequences which minimize the possibility of error, and (3) is given immediate feedback as to the correctness of his response.[6]

Frames based on these principles exemplify the behavioristic approach to language learning. The objective is conditioned responses, and the learning technique is one of conditioning these responses. Frames such as the following are based on the assumption that learning is a mechanical, not a mental process.

Joseph est le frère de Marie.
Joseph et Pierre sont les frères de Marie.
le frère le_ frère_
le frère les _____
le frère est les frères _____[7]

The first frame in the introduction to Sapon's programmed materials in Spanish indicates a similar approach.

1. You are looking at frame number 1. It contains some instructions, and an underlined space to write your answers.

   The underlined space is used to write down your a_____s.[8]

The author then provides an additional instruction which explains to the student what to do and the procedure for finding the correct answer. Applied to teaching language the frames embody identical principles.

1036. Here is the statement you just chorused:

   Sí, mis lecciones son interesantes.

   Read the statement aloud. ----------

1037. The word lección has an accent mark. Does the plural form lecciones have an accent mark?

   _____[9]

The Cognitive Viewpoint

In recent years cognitive psychologists have begun to challenge the basic tenets of behavioristic theories of learning. Their theories rest upon neuropsychological bases of thought and language, and as such are said to be mentalistic. Learning is not viewed as an array of conditioned responses to previously met stimuli, but as the acquisition and storage of knowledge. Behaviorist psychologists focus on the individual's response while cognitive psychologists emphasize the mental processes underlying that response.

Ausubel in his book Educational Psychology a Cognitive View rejects the conditioning theory of learning saying, ". . .it is evident that the use of the conditioning paradigm to explain the process whereby representational meaning is acquired constitutes an unwarranted extension of principles that are valid for certain simple kinds of learning to a more complex task and qualitatively different kind of learning."[10] Behavioristic theories, then, may explain simple levels of learning. However, they are not sufficiently encompassing to explain such complex processes as representational learning, i.e., the ability to symbolize the world through words.

In fact, the model for learning which Ausubel postulates is quite different from behavioristic techniques. He feels that the learning process must be one of "meaningful learning." Information acquired in a rote fashion, i.e., "arbi-

trarily and verbatim" is of little use to the learner and is quickly frgotten. The important criterion is whether the new knowledge can be incorporated, or "subsumed," into the learner's existing cognitive structure, i.e., what he already knows. In order for the learner to relate new material to what he has learned previously this materia! must be "relatable to his structure of knowledge on a nonarbitrary and nonverbatim bases."[11] The implicati on here is that the instructional materials should assist the student to understand all that he is to learn and to relate all new material to prior knowledge. This newly acquired knowledge must not be learned in an arbitrary or verbatim fashion. In other words, the student must be able, after learning, to state what he knows in his own terms. A word for word regurgitation is rote learning and as such not truly meaningful nor valuable to the student's cognitive processes. Information acquired by rote does not assist the learner in acquiring additional knowledge, and it is highly unlikely to transfer to new contexts. Ausubel states that "the acquisition of large bodies of knowledge is simply impossible in the absence of meaningul learning."[12]

The assumption based on behavioristic theories, has been that language is conditioned verbal behavior. However, many writers in language, psychology and linguistics are now saying that language is much more complex than had been previously supposed. Spolsky draws an important distinction when he states, "Knowing a language involves not just the performance of language-like behaviors, but an underlying competence that makes such performance possible. By ignoring this, it has been easy to make exaggerated claims for the effectiveness of operant conditioning in second-language teaching."[13] Chomsky questions the behavioristic interpretation of language learning saying, ". . .it seems to me impossible to accept the view that linguistic behavior is a matter of habit, that it is slowly acquired by reinforcement, association, and generalization. . ."[14] It now appears that the infinite variety of possible communicative utterances in the native speaker's repertoire cannot be accounted for on the basis of stimulus-response learning. Miller et al say that if the conditioning of stimulus-response connections were the means of language acquisition, a childhood 100 years long with no interruptions for sleeping, eating, etc., and a perfect retention of every string of twenty words after one presentation would be necessary to account for the language skill.[15] NcNeill seconds this notion and emphasizes the creative aspects of language when he explains, "The use of language resembles more writing a play than performing in one."[16]

Ohmann points out that the native speaker is so familiar with his own

language that he is unlikely to be aware of the complexity of the skill he possesses. He has the ability to comprehend and to use an infinite variety of sentences, many of them completely novel. To emphasize the complexity of language Ohmann uses as an example a situation in which twenty-five native speakers are asked to describe a scene in which a tourist is waiting outside a telephone booth while a bear talks on the phone. A computer analysis of the twenty-five descriptions showed that they contain enough linguistic data for "19.8 billion sentences, all describing just one situation." He goes on to say that, "When one reflects that the number of seconds in a century is only 3.2 billion, it is clear that no speaker has heard, read, or spoken more than a tiny fraction of the sentences he could speak or understand, and that no one learns English by learning any particular sentences of English."[17]

Although programmed materials in the past have primarily been applications of Skinnerian theories of learning, it is not necessarily true that programmed instruction must limit itself to theories of conditioning. Programmed instruction is also evolving. As changes have occurred, the tendency has been to move away from the short, small-step frames of Skinner. In fact, Markle says that they are "out" at present.[18] As programmers have abandoned the traditional linear programs the direction has been from conditioning to cognition. In Really Understanding Concepts the authors, Markle and Tieman, discussing student learning, say that, "the test that he really understands the concept is always his ability, not to tell us what we have told him, but to go beyond our teaching to new examples and non-examples."[19] Although the attempt in their presentation is to accomplish this understanding of concepts within the limits of conditioning theory, the end result seems to be very little different from the objectives of Ausubel.

Programmed materials in agreement with cognitive principles place initial emphasis upon understanding. After comprehending the concept, whether it be some aspect of phonology, semantics or syntax, the student continues practicing the language form to be learned. In Mueller and Niedzielski's programmed French materials, for example, the lessons dealing with forms and sentence patterns begin with a complete explanation of the structure to be learned. In the first frame the student is asked to discriminate between correct and incorrect responses. Frames of drill exercises follow, and the oral sequence ends with application exercises in which the student is expected to expand upon what he has been practicing. The application exercises ask the student to pose questions as well as supply the answers.

For example:

joue-- Demandez-leur ce qu'ils font dans le jardin.

A. Qu'est-ce que vous faites?

B. Nous jouons.

A. Où est-ce que vous jouez?

B. Nous jouons dans le jardin.[20]

In the Intermediate Course there is an increased emphasis on understanding prior to practice, and the focus of the exercises is placed on transformations. After studying an introductory explanation of the adjective function in prepositional phrases, prepositional infinitive phrases and clauses, for example the student proceeds through a series of frames in which he practices transformations of these forms. In the first frame he changes phrases as "l'enseignement français" to "l'enseignement du français." A few frames later he is changing "La France a enseigné la liberté aux nations africaines. Elle en avait le devoir." to "La France avait le devoir d'enseigner la liberté aux nations africaines." Finally, he has progressed to the point of asking and answering questions similar to the following example:

On y a pris ce vote.

A. C'est ça la scène.

B. Quelle scène?

A. La scène où on a pris le vote.

Mueller and Niedzielski incorporate cognitive procedures into their materials and at the same time eliminate the traditional blanks found in linear programs. The following examples (From Spanish for Communication now being developed by Bull et al.) also include a great deal of stress on cognition, but retain the blanks. The following two frames exemplify the stress placed on the understanding and organization of knowledge:

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Part 1: The Future

1. What you are going to learn in the next paragraph will probably be something of a surprise to you.

From the point of view of the first suffix of the Spanish verb forms there are only two tense forms in Spanish: those that have a present tense suffix and those that have a past tense suffix. Let's prove this. How many morphemes are there in either the present indicative vendemos or the present subjunctive vendamos?

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HOW TO GET MEANING FROM STEMS AND FROM CONTEXT

1. One way of distinguishing between a well trained and poorly trained foreign-language student is to measure how much time he spends looking up new words in the dictionary. The poorly trained student exhibits two main characteristics: first, he does not have the courage to trust his own linguistic detective ability; and second, he is much too afraid of making a mistake. He may know, for example, caer and its perfect participle caído, but he will look up two words in translating Miguel montaba a caballo cuando sufrió una caída penosa.

Does the una in front of caída tell you that this is the noun form of caído?

Discussion

In some respects the instructor's task was much easier, at least psychologically, in the late fifties and early sixties than it is today. The general excitement and enthusiasm for a new approach, i.e., conditioning techniques in language instruction, whether in the classroom or in programmed materials. There was no hesitation, no self-doubt, no concern with choosing between opposing philosophies of language teaching. Today the situation is different. The instructor is confronted with two basic philosophies. How does he choose?

The answer seems to be that at present he cannot, or should not. Above all, he should avoid the temptation to say, "This is the right way." If anything has been learned to date, it is that there is no single best way. Students are different, and they learn in different ways. In a study at Purdue University, for example, the results of a statistical analysis of student data indicated with quite a high degree of certainty which students would be more successful in a cognitive class and which would be successful in an audio-lingual habit class.[21] The implication is clear. An effort must be made to provide as many different learning experiences as possible.

Other studies have dealt with low ability students. Pimsleur's research at the high school level led him to conclude that 10 to 20% of the beginning language students have a disability which causes them to be under-achievers in language classes.[22] Studies reported by Mueller[23] and by Mueller and Harris[24] indicated that it is the student with average aptitude or below who profits most from programmed learning materials. Chastain found that audio-lingual students with low verbal ability achieve higher scores in the

four language skills than students with high verbal ability. The opposite is true in cognitive classes.[25]

If there is "no one way," what generalizations may be formulated at present? First, teachers and programmers need to realize that individualization consists of more than pace. One possibility is to move in the direction of providing programs which maximize the effectiveness of the student's capabilities as he proceeds through the course. There seems to be sufficient evidence to assume that some students prefer the Skinnerian approach while others learn better in materials which are based on cognitive theories of learning. The alternative is to include both types of instruction within any given program. Both possibilities should be explored.

Given the fact that materials based on both theories seem to be successful with certain groups of students the next question to be asked concerns the subject matter itself, "What aspect of language teaching can each do best?" Speaking as a language teacher, not as a programmer, this author would like to suggest that phonology can best be taught according to conditioning techniques. Perhaps conditioning drills could be supplemented with drawings of tongue and lip positions and explanations in order to enhance cognitive understanding of each sound, but the basic objective and method in the acquisition of sounds early in the course sequence would seem to be primarily one of conditioning. Teaching vocabulary could be achieved by using both types of frames. In dealing with semantics it would seem that conditioning should be stressed more than cognition. However, it seems logical at this stage to begin separating the students into two groups, one which needs to be drilled more and one which prefers, and has the ability, to learn by assimilating larger chunks of material. Teaching syntax would seem to require the programmer to provide both types of learning. For the slower student the frames would be designed to drill certain responses while the brighter students would be provided materials which have fewer drill frames, but which assist him in organizing the content at a higher conceptual level.

The preceding paragraph seemingly indicates that programmed materials can teach all three aspects of language. That is true. It is not a logical conclusion, however, to assume that programmed instruction is synonymous with self instruction. Various writers have stated that in language learning programmed instruction by itself is not enough.[26] If, then, programmed materials cannot produce the ideal bilingual student, what can they do? Again, from the viewpoint of a language teacher, this author feels that they can become a most important adjunct to the classroom teacher. Language acquisition, in this author's

opinion occurs in three stages: 1. understanding, 2. drill, and 3. application. Seemingly, programmed materials can lead the student through the first two stages, but not the third. From a different perspective, that of the four language skills, one would expect students to be able to acquire the passive skills through the use of programmed materials. These same materials can drill speaking and writing, but at that point their possibilities become quite limited. Only the teacher can help the student take the step beyond to "real" language practice.[27]

It is appropriate at this point to digress from the discussion to describe a study conducted last semester at Purdue University in which the researcher, Gilbert Jarvis, has offered a theoretical distinction between drill language and "real" language. According to Jarvis, the important distinction is that "real" language activity provides the student with a "referent" for what he says. For example, as the student substitutes various colors for the word "white" in the sentence, "The house is white.", he has no referent. Neither does he have in a cued response drill in which he is told to answer white before being asked what color the house is. However, if the student is asked what color <u>his</u> house is, then he has a referent, i.e., his answer is a verbalization of a mental picture in his mind. Drills are mere manipulations of structural forms and as such are qualitatively different from "real" language activity.

Jarvis' definition coupled with the fact that past research has indicated above all else that students learn to do what they do mandates that the student be given the opportunity for "real" language practice. Otherwise, he cannot be expected to acquire that native-like ability which is ostensibly the goal of language teaching.

The necessity of providing language activity as outlined in the two preceding paragraphs is the ultimate objective of language teaching: yet it is the type of practice which programmed materials are least able to supply. Speaking the language involves a sequence of speeches in which two or more people interact with each other as they express their own ideas and opinions. Programmed materials, simulated tutoring and simulated conversation can provide this type of activity only in the most minuscule fashion.

Conclusion

The search for teaching techniques and procedures with which to achieve native-like ability in second-language learning continues. The fact that the

profession is now willing to consider various approaches offers hope for a combination of theories and techniques which will be superior to the exclusive use of any single approach. Certainly the evidence at present lends little support to a continued search for the one way to teach. Teachers, students, and the many components of language itself are too varied to justify an insistence upon one particular method. The better question would be to ask which approach should be used with which students by which teachers and for which aspects of the language.

The indications are that these questions are now being asked. Recent changes in both audio-lingual and programmed materials toward including more elements of cognition reflect an increasing awareness of the complexity of the language, language learning and the language learner. New terms such as "guided learning" by Valdman and "designed learning" by Carroll reflect an emerging awareness of the need to include as many different types of learning situations as possible in any instructional program if maximum efficiency and achievement are to be attained. The fact that previous attempts have failed should not deter additional efforts toward the goal. It is time for the profession to continue its search for new solutions to old problems. Past failures have little value as bases for arguments, but they can serve as valuable guideposts toward future progress. Experience can be the best teacher.

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